ATTACHMENT FOR SPECIFICATION AMENDMENTS
SERIAL NO. 09/941,386

Please amend the following paragraphs:

[0020] In the event of a crash, the function of each of the sub-sections of the frame assembly is different. The middle section, passenger compartment, of the vehicle is preferably constructed to resist deformation and retain its shape in order to protect occupants. The front and rear sections are designed to absorb the energy of the crash. As shown in Figure 1, vehicle 10 includes a rear frame section denoted by numeral 12 having a [lower frame rail] <u>structural</u> member 14 disposed therein for increasing frame strength and stiffness (i.e., preventing undesired deformation).

[0021] Rear frame section 12 is comprised of longitudinally oriented left rear lower rail 16, longitudinally oriented right rear lower rail 18, cross car support 20 and left and right upper rails 22 and 24, connecting left and right rear lower rail<u>s</u> 16 and 18 to cross-car support 20, respectively. Left upper <u>rail</u> 22 and right [lower] <u>upper</u> rail 24 angle generally downward and rearward from cross-car support 20 and connect to lower rails 16, 18, thus triangulating the rear [portion] <u>section</u> 12 to achieve the desired stiffness while optimizing the mass of the vehicle frame. As shown in Figure 2, left upper rail 22 connects to left rear lower rail 16 at point A, located generally at the middle of rear lower rail 16.

[0022] In the event of a collision, energy from the collision is transferred from the bumper 26 to rear lower rails 16, 18. For simplicity, the performance of left lower rail 16 will be discussed. As mentioned above, rear lower rail 16 is attached to the middle section of the vehicle at one end typically

a rear torque bearing member such as a torque box and to upper rail 22 at point A. If the load of the collision acts along its longitudinal axis, rail 16 dissipates the energy from the collision through compression by compacting the tubular frame rail axially onto itself. If the energy from the collision is not totally dissipated by axial deformation or the impact is non-axial, lower rail 16, as discussed above, may bend about a hinge point, typically at joint A. Bending of lower rail 16 is undesirable for several reasons. First, bending of a tubular element does not dissipate as much energy as an axial collapse deformation. Therefore, more energy is transferred to the middle section of the vehicle, acting on the occupants. Second, the bending of the rear frame rail may result in unpredictable deformation of the vehicle frame causing the frame members or other components to come in unwanted contact with other components.

[0023] In the exemplary vehicle of Figures 1 and 2, bending of the lower rail 16 would typically occur at connection point A as described above. Connection point A and triangulation of lower rail 16 and upper rail 22 represents a corner of a substantially rigid structure relative to lower rail 16 extending rearwardly therefrom. Lower rail 16 extends generally rearward from connection point A. This configuration may cause the extended portion of rear [upper] lower frame rail 16 to be more susceptible to bending.

[0024] Noting the possible issues with the rear [upper] lower rails not fully dissipating energy and the unwanted effects of bending, it is advantageous to provide a frame element that promotes axial deformation of the rear [upper] lower frame rails and prevents bending.

[0025] In the present invention, structural member 14 is disposed within the lower rails 16, 18 to prevent bending and increase the amount of energy required to deform the frame rails axially. Structural member 14 is defined by a tubular [shaped] main body portion 30 having a perimeter complimentary to the interior perimeter of frame rail 16. Additionally, structural member 14 includes two ribs 32, 34 diagonally located within the main body portion for operatively increasing the structural deformation characteristics of member 14.

[0028] Ribs 32, 34 of structural member 14 further increases the strength of the frame rails. The ribs 32,34, like the tubular main body portion 30 of the structural member 14 increase the amount of material that must be deformed, thereby increasing locally strength of the assembly. The orientation of the ribs may be constructed in the tubular body as to increase the strength of the assembly in a certain bending plane. For example, diagonally oriented ribs 32, 34 dramatically increase the amount of energy that can be absorbed if the frame members were bent about a vertical axis (z) or a transverse axis (y).

[0030] As shown in Figure [4] 6, a third preferred embodiment of the present invention, structural member 50, is shown. Structural member 50 is comprised of a generally rectangular body 52 and horizontal support ribs 54. Horizontal support ribs 54 are disposed inside rectangular body 52 and connect a first side of generally rectangular body to a second side of the generally rectangular body located opposite of the first side. Thus, ribs 54 significantly increase the movement of inertia and thus the bending stiffness of about the vertical (z) axis without significantly increasing the movement of inertia about the transverse (y) axis.

[0031] Figure [5] 7 illustrates a fourth preferred embodiment of the present invention, structural member 60. Structural member 60 is comprised of a generally rectangular body 62, horizontal support ribs 64, and vertical support ribs 66. Ribs 64 and 66 are disposed inside rectangular body 62 and connect a side of generally rectangular body to another side of the generally rectangular body located opposite of the first side to form a series of intersecting ribs. Thus, ribs 62, 64 (similar to ribs 32,34), significantly increase the movement of inertia and the bending stiffness about both the vertical (z) and transverse (y) axes.

[0035] In a preferred method, the present invention is secured within a tubular frame member by use of external fasteners. It is also understood that the present invention may be secured in a tubular frame member by use of adhesives, interference fit, and external depressions (48, See Fig. 5).

[0037] With reference to Figure [6] 8, a graph 70 showing the relative displacement of a vehicle sill (vertical axis) with respect to time (horizontal axis) is shown. In vehicle impact testing, a vehicle is impacted with a barrier to approximate a vehicle to vehicle collision. The graph in Figure [6] 8 illustrates the displacement of the rear sill of an exemplary vehicle after impact with a barrier at 50 mph. The bold line 72 indicates the relative displacement, when the rear frame includes the structural member of the present invention. The second line 74 indicates the relative displacement, of the standard rear frame (i.e. without structural member 14). As shown, the inclusion of structural member 14 of the present invention results in a significant reduction in relative displacement of the sill in rear-on collisions.

[0038] With reference to Figure [7] 9, a graph 80 showing the velocity of the barrier and the exemplary vehicle are shown after the impact test described above. As shown, the velocity of the vehicle with respect to the barrier (shown in dashed lines) is initially at about 50 mph. When the vehicle impacts the barrier (t = 0.0), the velocity of the vehicle (shown in dashed lines 82, 86) begins to decrease and the velocity of the barrier (shown in said lines 84, 88) begins to increase. Shown in bold lines 82, 84 are the velocity curves of the barrier and the vehicle having structural member of the present invention included. As illustrated, the inclusion of the structural member 14 of the present invention allows the energy of the collision to be absorbed in less time than the vehicle not having the structural member 14. Therefore, it is shown that the structural member 14 allows the vehicle frame to more effectively absorb the energy of the crash without significantly altering the velocity profile associated with the collision.